Clinical

The sensitivity of pre-hospital and in-hospital tools for the identification of major trauma patients presenting to a major trauma centre.

D Potter, A Kehoe, JE Smith

Abstract

The identification of major trauma patients before arrival in hospital allows the activation of an appropriate trauma response. The Wessex triage tool (WTT) uses a combination of anatomical injury assessment and physiological criteria to identify patients with major trauma suitable for triage direct to a major trauma centre (MTC), and has been adopted by the South-West Peninsula Trauma Network (PTN). A retrospective database review, using the Trauma Audit Research Network (TARN) database, was undertaken to identify a population of patients presenting to Derriford Hospital with an injury severity score (ISS) >15. The WTT was then applied to this population to identify the sensitivity of the tool. The sensitivity of the WTT at identifying patients with an ISS>15 was 53%. One of the reasons for this finding was that elderly patients who are defined as having major trauma due to the nature of their injuries, but who did not have a mechanism to suggest they had sustained major trauma (such as a fall from standing height), were not identified by these triage tools. The implications of this are discussed.

Introduction

The UK Defence Medical Services embed their medical and nursing staff within major trauma centres to train specifically for their operational role. Derriford Hospital in Plymouth is the major trauma centre (MTC) for the South-West region’s Peninsula Trauma Network (PTN).

Major trauma is often defined as an injury severity score (ISS) of greater than 15. This is calculated from the abbreviated injury scale codes for each anatomical region (1). The UK Trauma Audit Research Network (TARN) holds a national database that captures data on trauma patients who: are admitted to hospital following trauma for at least 72 hours; admitted to a critical care unit, or; who die from their injuries (2).

The demographics of the trauma patient population are changing. The proportion of the major trauma workload that is elderly is increasing, and the predominant mechanism causing injuries classified as major trauma in our population is now, falls of less than 2 metres (standing height or below) (3).

To get the right patient to the right hospital at the right time, bypass criteria have been developed that empower ambulance crews to bring trauma patients directly to a MTC. One example is the Wessex triage tool (WTT), which uses a combination of anatomical and physiological criteria to identify patients with major trauma that are suitable for transfer direct to a MTC (Figure 1). In hospital, trauma team activation criteria attempt to identify patients requiring the attention of a multi-disciplinary trauma team. Our hospital criteria include a combination of mechanism, specific anatomical injury and abnormal physiology to activate the hospital trauma team (Figure 2) in response to an ambulance service alert. This has been adopted across the South West PTN.

However, these tools rely on mechanism prompts within the criteria that may suggest that major trauma has occurred. They may not identify patients who have fallen from standing height, or have deteriorated some time after the index injury, as may happen when elderly patients present following a low energy mechanism of injury such as a fall.

The aim of this study was to establish the sensitivity of the WTT and hospital trauma team activation criteria in identifying major trauma patients presenting to this MTC.

Methods

A retrospective database review, using the TARN database, identified patients with ISS>15 who presented directly to Derriford Hospital in the 12 month period from 1 Apr 11 to 31 Mar 12. Patient demographics, mechanism of injury, pre-hospital physiology, detailed injury description and outcome data were recorded. The WTT was applied to this cohort of patients retrospectively. Where data were missing (most commonly the pre-hospital motor component of the
Glasgow Coma Score) it was assumed the tool would have identified the patient successfully. It was assumed that any WTT-qualifying injury would have been identifiable in the pre-hospital phase, irrespective of the severity of that injury. Whether or not a trauma team had been activated was recorded from the TARN database directly.

Statistical analysis was performed to compare differences between major trauma patients identified by the WTT, and those met by a trauma team, and those not.

**Results**

During the study period 175 patients with ISS >15 presented directly to Derriford Hospital. 4 had suffered traumatic cardiac arrest at scene and were excluded from analysis. Data for the remaining 171 are presented in Table 1. From the original 175 patients, 10 entries did not identify whether or not a trauma team had been activated and were excluded from this part of the analysis. Data for the remaining 165 are presented in Table 2.

**Discussion**

The sensitivity of the WTT for identifying major trauma patients in our system is 53%. The patients with major trauma that were missed by the WTT were significantly older and more likely to have been injured by a low fall, but there was no significant difference in survival. Derriford Hospital trauma team activation criteria are also poor at identifying these patients in our system with a sensitivity of 43%. Again, this may be due to the number of elderly
patients falling from low height with significant head injury previously identified within this cohort. The unexpectedly low figure may also be due to error in recording.

The trends in national figures mirror those found locally in Derriford, namely that the proportion of major trauma patients who are elderly, and fall from standing height or less, is increasing. The implications of this are that if these patients are not identified by triage tools, they will not activate a trauma team, patient outcome may be affected and key performance indicators such as time to CT scan within 30 minutes may not be achievable. This will have knock-on effects on the revenue received by hospitals for dealing with major trauma patients.

The phenomenon of missed or under-triage of elderly patients has been described before, and some have suggested that age in itself should be a trigger for trauma team activation (4,5). In one study, elderly trauma patients were significantly less likely to activate a trauma team, and those who were not seen by a trauma team had worse outcome (6). In another study from the USA looking at outcome before and after implementation of ‘age >70 years’ as a specific trauma team activation trigger (7), being met by a trauma team seemed to improve outcome. This will be dependant on the reversibility of the pathology resulting from the injury.

However, it may not be appropriate to manage elderly patients with isolated low energy head injury in the same way as younger patients with polytrauma. Major trauma patients with multiple injuries for whom a trauma team was not activated are unlikely to receive the prompt treatment their injuries demand. However, elderly patients in this cohort with low energy mechanisms of injury, who typically sustain intracranial injury with abbreviated injury scale of greater than 4 (and therefore ISS>15), are often not candidates for aggressive surgical management, and in our hospital are often admitted under the elderly care physicians for conservative management.

From a financial perspective, hospitals risk losing a

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<th>Table 1: Wessex Triage Tool applied to Derriford Hospital major trauma patients</th>
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<td>Overall</td>
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<td>Age (yrs)</td>
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<td>% Male</td>
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<td>% motor vehicle collision</td>
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<td>% fall &lt;2m</td>
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<tr>
<td>ISS2</td>
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<td>Hospital length of stay (days)</td>
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<td>% undergoing surgical procedure</td>
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<th>Table 2: Activation of trauma team for major trauma patients presenting to Derriford Hospital</th>
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<td>Trauma Team</td>
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<tr>
<td>Age (yrs)</td>
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<td>% Male</td>
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Mean1 *student’s t-test | Median2 **Fisher’s exact test | ***Mann-Whitney U-test
substantial amount of income from best-practice tariff if such patients are not seen on arrival by a consultant-led trauma team, but this may not always be indicated. It may therefore be more appropriate in the future to rule out some of these patients from inclusion in the TARN database.

The implications for training military consultants in acute specialties in major trauma centres are yet to be defined. Undoubtedly, what major trauma there is will likely be concentrated in major trauma centres, and involvement in the development of clinical pathways, team training, and governance is likely to represent the best environment for military clinicians to flourish. However, the UK civilian trauma population is getting ever older and farther from that seen on deployed operations.

Conclusion
Our current bypass and trauma team activation criteria are not able to detect elderly patients who fall from low height, but who may suffer significant injuries.

Acknowledgements
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References
1. Gennarelli TA, Wodzin E (eds), Abbreviated Injury Scale. Association for the Advancement of Automotive Medicine. Barrington, IL, USA; 2005


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Conference announcement - Haslar Conference 2013

Cranfield University and Haslar Heritage Group are organising a multidisciplinary conference to present the results of four seasons of archaeological excavations at Haslar Hospital.

This conference will combine both archaeological and historical research and will be held on the 24th and 25th of May 2013. Subjects will include Scurvy in the Haslar skeletons, Autopsies at Haslar and The future of Haslar Hospital, and among the speakers will be Jane Wickenden, Historic Collections Librarian at INM.

For further information and tickets please contact:
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